

Table 2: p24

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(140-152 IIIB)	p24(8-20)	GQMVHQAI SPRTL	HIV-1 infection	human(Cw3)	[Littaua et al.(1991)]
		• Fine specificity of human Cw3 restricted Gag CTL epitope			
p24(140-159)	p24(8-27)	GQMVHQAI SPRTL NAWKVV	HIV-1 infection	human(B14)	[Musey et al.(1997)]
		• CTL specific for this epitope was found in the peripheral blood but not cervical mucosa of one donor			
p24(143-164 BH10)	p24(11-32)	VHQAI SPRTL NAWVK-VVEEKAF	HIV-1 infection	human(Bw57)	[Johnson et al.(1991)]
		• Gag CTL response studied in three individuals; optimal peptides for binding were mapped by peptide competition			
p24(143-162 LAI)	p24(11-32)	VHQAI SPRTL NAWVK-VVEEKAF	HIV-1 infection	human(not A2)	[van Baalen et al.(1996)]
		• Unknown HLA specificity, but not A2			
p24(147-155 IIIB)	p24(15-23)	ISPRTL NAW	HIV-1 infection	human(B*57)	[Wilkes et al.(1996)]
		• Epitope defined in the context of the Pediatric AIDS Foundation ARIEL project mother-infant HIV transmission study			
p24(147-155 IIIB)	p24(15-23)	ISPRTL NAW	HIV-1 infection	human(B*5801,B*57)	[Goulder et al.(1996b)]
		• Five slow progressors made a response to this epitope, and in two it was the dominant response			
		• Peptide defined on the basis of B*5801 binding motif, yet not cross-restricted except at high concentrations			
p24(151-159)	p24(19-27)	TLNAWVKVV	HIV-1 infection	human(A2)	[Parker et al.(1992), Parker et al.(1994)]
		• Study of sequence motifs preferred for peptide binding to class I HLA-A2			

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(153-174 BH10)	p24(21-42)	NAWVKVVEEKAFSPE-	HIV-1 infection	human(Bw57)	[Johnson et al.(1991)]
	VIPMFSA				
	• Gag CTL response studied in three individuals; optimal peptides for binding were mapped by peptide competition				
p24(153-172 SF2)	p24(21-40)	NAWVKVVEEKAFSPE- VIPMF	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
	• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein				
	• 12 subjects had CTL that could lyse vaccinia expressed LAI gag				
	• One of these 12 had CTL response to this peptide				
	• The responding subject was HLA-A2, B21				
p24(160-179)	p24(28-47)	EKAKAFSPEVIPMFSAA-	HIV-1 infection	human(B27)	[Musey et al.(1997)]
	LSEGA				
	• Cervical and peripheral blood derived CTL clones from an HIV infected woman recognized this epitope				
p24(162-172 LAI)	p24(30-40)	KAFSPEVIPMF	HIV-1 infection	human(B*57)	[Goulder et al.(1996b)]
	• This peptide was recognized by CTL from five slow progressors				
	• Peptide defined on the basis of B*5801 binding motif, yet not cross-restricted except at high concentrations				
	• This epitope is highly conserved				
p24(163-182)	p24(31-50)	AFSPEVIFPMFSALSF- GATPQ	HIV infection	human(unk)	[Lieberman et al.(1995)]
	• HIV-specific CTL lines developed by <i>ex vivo</i> stimulation with peptide				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(163-182 SF2)	p24(31-50)	AFSPEVIFMFSALSE-GATPQ	HIV infection	human(unk)	[Lieberman et al.(1997)]
		<ul style="list-style-type: none"> • Of 25 patients, most had CTL specific for more than 1 HIV-1 protein • 12 subjects had CTL that could lyse vaccinia expressed LAI gag • One of these 12 had CTL response to this peptide • The responding subject was HLA-A2, B21 			
p24(167-175 LAI)	p24(35-43)	EVIPMFSAI?		human(A26)	[Goulder et al.(1996a)]
		<ul style="list-style-type: none"> • Identified as optimal epitope within Gag sequence AFSPEVIFMFSALSEGATPQ • Relatively conserved epitope within B clade and in other clades • Suspected binding motif for HLA-A26 includes T or V anchor at position 2, negative charge at position 1 			
p24(168-175 LAI)	p24(36-43)	VIPMFSAI?		human(Cw01.02)	[Brander & Walker(1997a)]
		<ul style="list-style-type: none"> • P. Goulder, submitted 			
p24(169-184 LAI)	p24(37-52)	IPMFSALESEGATPQD-L	HIV-1 infection	human(B12(44))	[Buseyne et al.(1993)]
		<ul style="list-style-type: none"> • Clustering of Gag p24 CTL epitopes recognized in 29 HIV infected people 			
p24(173-192 SF2)	p24(41-60)	SALSEGATPQDLNTM-LNTVG	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
		<ul style="list-style-type: none"> • Of 25 patients, most had CTL specific for more than 1 HIV-1 protein • 12 subjects had CTL that could lyse vaccinia expressed LAI gag • Three of these 12 had CTL response to this peptide • The responding subjects were HLA-A3, A32, B7, B14; and HLA-A2, A3, B14, B44; and HLA-A1, A2, B8, B14 			
p24(173-194 BH10)	p24(41-62)	SALSEGATPQDLNTM-LNTVGHH	HIV-1 infection	human(B14)	[Johnson et al (1991)]
		<ul style="list-style-type: none"> • Gag CTL response studied in three individuals; optimal peptides for binding were mapped by peptide competition 			

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(179-187 IIIB)	p24(47-55) ATPQDLNTM		HIV-1 infection	human(B7)	[Wilkes et al.(1996)]
	• Epitope defined in the context of the Pediatric AIDS Foundation ARIEL project mother-infant HIV transmission study				
	• APPQDLNTM, a naturally occurring variant, was found in non-transmitting mother and was less-well recognized				
p24(181-189)	p24(49-57) PQDLNTMLN	HIV-1 infection	human(B14)	Lubaki et al.(1997)]	
	• 82 HIV-1-specific CTL clones from 5 long term non-progressors were isolated and analyzed for breadth of response				
	• A sustained Gag, Env and Nef response was observed, and clones were restricted by multiple HLA epitopes, indicating a polyclonal response				
	• Despite this being a well defined conserved epitope, none of the 11 gag-specific clones from a B-14 positive subject could recognize either it or p24 RAEQASQEY				
p24(179-187 IIIB)	p24(47-55) ATPQDLNTM	HIV-1 infection	human(B7)	[Wilkes et al.(1996)]	
	• Epitope defined in the context of the Pediatric AIDS Foundation ARIEL project mother-infant HIV transmission study				
	• APPQDLNTM, a naturally occurring variant, was found in non-transmitting mother and was less-well recognized				
p24(180-188 IIIB)	p24(48-56) TPQDLNTML	HIV-1 infection	human(?B7)	[Wilkes et al.(1996)]	
	• Epitope defined in the context of the Pediatric AIDS Foundation ARIEL project mother-infant HIV transmission study				
p24(183-202 SF2)	p24(51-70) DLNTMLNTVGHQAA-MQMLK	HIV-1 infection	human(unk)	Lieberman et al.(1997)]	
	• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein				
	• 12 subjects had CTL that could lyse vaccinia expressed LAI gag				
	• One of these 12 had CTL response to this peptide				
	• The responding subject was HLA-A26, A30, B38				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(183-191 LAI)	p24(51-59)	DLNNTMLNTV	HIV-1 infection	human(B14)	[McMichael & Walker(1994)]
		• Review of HIV CTL epitopes; defined by B14 motif found within a larger peptide			
p24(194-202 LAI)	p24(62-70)	HQAAMQMLK	?	human(B52)	[Brander & Walker(1997a)]
		• P. Coulter, pers. comm.			
p24(193-214 BH10)	p24(61-82)	GHQAAAMQMLKETINE-EAAEWDR	HIV-1 infection	human(Bw52)	[Johnson et al.(1991)]
		• Gag CTL response studied in three individuals; optimal peptides for binding were mapped by peptide competition			
p24(193-212 SF2)	p24(61-80)	GHQAAAMQMLKETINE-AAEW	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
		• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein			
		• 12 subjects had CTL that could lyse vaccinia expressed LAI gag			
		• One of these 12 had CTL response to this peptide			
		• The responding subject was HLA-A26, A30, B38			
p24(193-203 BRU)	p24(61-71)	GHQAAAMQMLKE	HIV-1 infection	human(A2)	[Claverie et al.(1988)]
		• 1 of 4 epitopes first predicted, then shown to stimulate HLA-A2 restricted CTL line			
p24(199-207 SF2)	p24(65-73)	AMQMLKETI	DNA plasmid immunization	murine(H-2K ^d)	[Selby et al.(1997)]
		• Murine CTL response to peptide observed after immunization with DNA plasmid containing HIV-1 (SF2) p55gag gene regulated by bacteriophage T7 promoter			
		• CTL response required coadministration of rec vaccinia virus expressing T7 RNA polymerase or T7 RNA polymerase soluble protein			

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(199-207 SF2)	p24(65-73)	AMQMILKETI	vaccinia expressing gag and pol	murine(H-2K ^d)	[Doe & Walker(1997)]
	VVgagpol		• Immunodominant murine CTL response to this peptide observed after immunization with vaccine		
		• Optimal peptide was defined			
p24(203-212)	p24(71-80)	ETINEEAAEW	HIV-1 infection	human(A25)	[Klenerman et al.(1996)]
	• The epitope was defined through direct stimulation of PBMC with 20-mer peptides				
	• It is in a conserved region, ETINEEAAEW is found in most B, D, and E subtype isolates				
	• DTINEEAAEW is found in A and some D subtype sequences				
p24(203-212)	p24(71-80)	ETINEEAAEW	HIV-1 infection	human(A25)	[van Baalen et al.(1996)]
	• Conserved between B and D subtypes, variable in other clades; a consensus of clades A, C, F, G, and H and a peptide of HIV-2ROD over this region were not recognized by CTL recognizing the index peptide; no variants in this epitope were observed in a long term survivor over 8 years				
p24(203-222 SF2)	p24(71-90)	ETINEEAAEWDRVHP-	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
	VVHAGP				
	• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein				
	• 12 subjects had CTL that could lyse vaccinia expressed LAI gag				
	• One of these 12 had CTL response to this peptide				
	• The responding subject was HLA-A2, B21				
p24(215-223 IIIB)	p24(83-92)	VHPVHAGPIA	HIV-1 infection	human(B55)	[Sipsas et al.(1997)]
	• HIV IIIB proteins were used to define the range of CTL epitopes recognized by 3 lab workers accidentally infected with HIV-1 IIIB				
	• LHPVHAGPVA, a variant found in HIV-1 PH136, was also recognized				
	• LHPVHAGPLA, a variant found in HIV-1 RF, was also recognized				
	• LHPVHAGPTI, a variant found in HIV-1 MN, was also recognized				
	• LHPAQAGPLA, a variant found in HIV-1 JH3, was recognized at high peptide concentrations				
p24(219-233 BRU)	p24(87-101)	HAGPIAPGQMREPRG	HIV-1 infection	human(A2)	[Claverie et al.(1988)]
	• 1 of 4 epitopes predicted then shown to stimulate HLA-A2 restricted CTL line				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(223-242 SF2)	p24(91-110)	IAPGQMIREPRGSDIA-GTTST	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
		<ul style="list-style-type: none"> • Of 25 patients, most had CTL specific for more than 1 HIV-1 protein • 12 subjects had CTL that could lyse vaccinia expressed LAI gag • One of these 12 had CTL response to this peptide • The responding subject was HLA-A2, A24, B13, B35 			
p24(233-252 SF2)	p24(101-120)	GSDIAGTTSTLQEQQI-GWMTN	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
		<ul style="list-style-type: none"> • Of 25 patients, most had CTL specific for more than 1 HIV-1 protein • 12 subjects had CTL that could lyse vaccinia expressed LAI gag • One of these 12 had CTL response to this peptide • The responding subject was HLA-A26, A30, B38 			
p24(240-249 LAI)	p24(108-117)	TSTTLQEQIGW	HIV-1 infection	human(B*57,B*5801)	[Goulder et al.(1996b)]
		<ul style="list-style-type: none"> • Response to this epitope was found in 4 slow progressing HLA-B*57 individuals, in 2 it was dominant or very strong • For one donor (from Zimbabwe) this was defined as the optimal peptide • This epitope can be presented in the context of the closely related HLA molecules B*5801 and B*57 			
p24(253-274 BH10)	p24(121-142)	NPPIPVGEIYKRWII-LGLNKIV	HIV-1 infection	human(B8)	[Johnson et al.(1991)]
		<ul style="list-style-type: none"> • Gag CTL response studied in three individuals; optimal peptides for binding were mapped by peptide competition 			
p24(253-272)	p24(121-140)	NPPIPVGEIYKRWII-LGLNK	HIV infection	human(unk)	[Lieberman et al.(1995)]
		<ul style="list-style-type: none"> • HIV-specific CTL lines developed by <i>ex vivo</i> stimulation with peptide 			

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(253-272 SF2)	p24(121-140)	NPPIPVGEIYKRWII-LGLNK	HIV infection	human(unk)	[Lieberman et al.(1997)]
		<ul style="list-style-type: none"> • Of 25 patients, most had CTL specific for more than 1 HIV-1 protein • 12 subjects had CTL that could lyse vaccinia expressed LAI gag • Two of these 12 had CTL response to this peptide • The responding subjects were HLA-A2, A3, B8, B62, and HLA-A1, B8, B18 			
p24(253-267)	p24(121-135)	NPPIPVGEIYKRWII	HIV-1 infection	human(B8)	[Gotch et al.(1990)]
		<ul style="list-style-type: none"> • High frequency of memory and effector Gag specific CTL 			
p24(255-274 SF2)	p24(121-140)	NPPIPVGEIYKRWII-LGLNK	HIV-1 infection	human(unk)	[van Baalen et al.(1993)]
		<ul style="list-style-type: none"> • Gag CTL epitope precursor frequencies were estimated and peptide mapping was performed 			
p24(255-274 SF2)	p24(121-135)	NPPIPVGEIYKRWII	HIV-1 infection	human(B8)	[Phillips et al.(1991)]
		<ul style="list-style-type: none"> • Longitudinal study of CTL escape mutants 			
p24(260-268 LAI)	p24(122-130)	PPIPVGDTIY	HIV-1 or -2 infection	human(B35)	[Rowland-Jones et al.(1995)]
		<ul style="list-style-type: none"> • Defined as minimal peptide by titration curve, PPIPVGEIY and HIV-2 form NPVPVGNIY are also recognized 			
p24(260-268 LAI)	p24(122-130)	PPIPVGDTIY	HIV-1 infection	human(B35)	[McMichael & Walker(1994)]
		<ul style="list-style-type: none"> • Review of HIV CTL epitopes; defined as minimal peptide by titration curve 			
p24(256-270 LAI)	p24(124-138)	IPVGEIYKRWIIILGL	HIV-1 infection	human(B8)	[Buseyne et al.(1993)]
		<ul style="list-style-type: none"> • Clustering of Gag p24 CTL epitopes recognized in 29 HIV infected people 			
p24(261-269)	p24(127-135)	GEIYKRWII	HIV-1 infection	human(B8)	[Sutton et al.(1993)]
		<ul style="list-style-type: none"> • Predicted epitope based on B8 binding motifs, from larger peptide NPPIPVGEGIYKRWII 			

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(259-267 LAI)	p24(127-135)	GEIYKRWII	HIV-1 infection	human(B8)	[Klenerman et al.(1994)]
	• Naturally occurring variant GDIYKRWII				
	• GDIYKRWII may act as antagonist				
p24(259-267)	p24(127-135)	GEIYKRWII	HIV-1 infection	human(B8)	[Nowak et al.(1995)]
	• Longitudinal study of CTL response; GDIYKRWII could also stimulate CTL, reactivity fluctuated				
p24(259-267)	p24(127-135)	GEIYKRWII	HIV-1 infection	human(B8)	[McAdan et al.(1995)]
	• Equivalent sequence GDIYKRWII also recognized by CTL from some donors				
p24(259-267 LAI)	p24(128-135)	EIYKRWII	?	human(B8)	[Goulder et al.(1997e)]
	• Defined in a study of the B8 binding motif				
p24(265-280 BRU)	p24(130-148)	YKRWIILGLNKIVRMY- YSPT	HIV-1 infection	human(B27)	[Dadaglio et al.(1991)]
	• Used as a positive control for HLA specificity				
p24(266-269 HIV-2)	p24(131-140)	RRWIQQLGLQK	?	human(B27)	[Brander & Walker(1997a)]
	• HIV-2, HLA-B*2703, S. Rowland-Jones, pers. comm.				
p24(263-284 BH10)	p24(131-152)	KRWIILGLNKIVRMY- SPTSIID	HIV-1 infection	human(Bw62)	[Johnson et al.(1991)]
	• Gag CTL response studied in three individuals; optimal peptides for binding were mapped by peptide competition				
p24(265-284 SF2)	p24(131-150)	KRWIILGLNKIVRMY- SPTSI	HIV-1 infection	human(Bw62?)	[van Baalen et al.(1993)]
	• Gag CTL epitope precursor frequencies estimated; HLA-Bw62 restriction considered most likely				
p24(263-282 SF2)	p24(131-150)	KRWIILGLNKIVRMY- SPTSI	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
	• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein				
	• 12 subjects had CTL that could lyse vaccinia expressed LAI gag				
	• One of these 12 A-2 had CTL response to this peptide				
	• The responding subject was HLA-A3, A32, B51, B62				

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(266-277)	p24(131-145)	KRWVILLGLNKIVRMY	rec gag-vaccinia	human(B27)	[Nixon et al.(1988)]
	• Gag CTL epitope mapped with rec gag-vaccinia and synthetic peptides				
	• This was the first HIV-1 epitope to be mapped				
p24(263-277 LAI)	p24(131-145)	KRWVILLGLNKIVRMY	HIV-1 infection	human(A33))	[Buseyne et al.(1993)]
	• Clustering of Gag p24 CTL epitopes recognized in 29 HIV infected people				
p24(266-277 LAI)	p24(131-145)	KRWVILLGLNKIVRMY	HIV-1 infection	human(B27)	[Meyerhans et al.(1991)]
	• Longitudinal study showing persistence of epitope despite CTL activity				
p24(265-279)	p24(131-145)	KRWVILLGLNKIVRMY	HIV-1 infection	human(B27)	[Nixon et al.(1990)]
	• HIV-1 and HIV-2 cross-reactive CTL clone, highly conserved epitope				
p24(265-279C)	p24(131-146)	KRWVILLGLNKIVRMY-C	HIV-1 infection	human(B27)	[Bonillot et al.(1989)]
	• HLA-B27 restricted epitope also binds to HLA-A2 and HLA-B37 in solid phase assay				
p24(265-276)	p24(131-142)	KRWVILLGLNKIV	no CTL shown	human(B27)	[Jardetzky et al.(1991)]
	• Epitope examined in the context of peptide binding to HLA-B27				
p24()	p24(131-140)	KRWVILLGLNK	HIV infection	human(B27)	[Rowland-Jones et al.(1997)]
	• Described in this review as the first identified HIV CTL epitope				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(263-272 LAI)	p24(131-140)	KRWIILGLNK	HIV-1 infection	human(HLA-B*2705)	[Goulder et al.(1997c)]
	• HLA-B*2705 is associated with slow HIV disease progression				
	• 11/11 HLA-B*2705 donors make a response to this epitope, usually an immunodominant response				
	• This is a highly conserved epitope				
	• The HLA-B*2705 binding motif includes R at position 2, and L in the C-term position				
p24(263-272 LAI)	p24(131-140)	KRWIILGLNK	HIV-1 infection	human(B27)	[Buseyne et al.(1993)]
	• Clustering of Gag p24 CTL epitopes recognized in 29 HIV infected people				
p24(263-272 LAI)	p24(131-140)	KRWIILGLNK	HIV-1 infection	human(B27)	[McMichael & Walker(1994)]
	• Review of HIV CTL epitopes; defined as minimal peptide by titration curve				
p24(263-272)	p24(131-140)	KRWIIMGLNK	HIV-1 infection	human(B27)	[Klenerman et al.(1994)]
	• Naturally occurring variant KRWIILGLNK may act as antagonist				
p24(263-272)	p24(131-140)	KRWIIMGLNK	HIV-1 infection	human(B27)	[Klenerman et al.(1995)]
	• Naturally occurring variant KRWIILGLNK may act as antagonist				
p24(265-274)	p24(131-140)	KRWIILGLNK	HIV infection	human(B27)	[Moss et al.(1995)]
	• In one individual, TCR usage changed over time indicating that new populations of CTL can be recruited				
	• TCR usage showed that a CTL clonal response to this epitope that persisted over 5 years				
	• CTL clones specific for HIV epitopes may represent between 0.2 and 1% of the total CD8+ population of T cells				
p24(265-276)	p24(131-140)	KRWIILGLNK	?	human(B27)	[Carreno et al.(1992)]
	• Included in HLA-B27 binding peptide competition study				

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(265-274 SF2)	p24(131-140)	KRWIILGLNK	HIV-1 infection	human(B27)	[Phillips et al.(1991)]
	• Longitudinal study of CTL escape mutants				
p24(263-272)	p24(131-140)	KRWIILGLNK	HIV-1 infection	human(B27)	[Nietfield et al.(1995)]
	• Single point mutations were introduced and viral viability and CTL recognition tested				
p24(263-272)	p24(131-140)	KRWIIMGNK	HIV-1 infection	human(B27)	[Nowak et al.(1995)]
	• Longitudinal study of CTL response; KRWIILGNK was also found, both forms stimulate CTL				
p24(263-272)	p24(131-139)	KRWIIMGLNK	HIV-1 infection	human(B27)	[Goulder et al.(1997d)]
	• Six HLA-B27 donors studied make a strong response to this epitope				
	• In 4/6 cases, this was the immunodominant or only CTL response				
	• Two of the cases had an epitope switch to the form KKWIIMGLNK during a period of rapid decline to AIDS, following their asymptomatic period				
	• The arginine to lysine switch is in an anchor residue, and results in immune escape due to severely diminished binding to the B27 molecule				
p24(268-277 LAI)	p24(136-145)	LGLNKIVRMV	Predicted from larger peptide	human(Bw62)	[McMichael & Walker(1994)]
	• Review of HIV CTL epitopes; defined by Bw62 motif found within a larger peptide				
	• Also P. Johnson, per. comm.				
p24(271-281)	p24(136-146)	LGLNKIVRMS	HIV-1 infection	human(B62)	[Lubaki et al.(1997)]
	• 82 HIV-1-specific CTL clones from 5 long term non-progressors were isolated and analyzed for breadth of response				
	• A sustained Gag, Env and Nef response was observed, and clones were restricted by multiple HLA epitopes, indicating a polyclonal response				
	• A subject who was B62+ had CTL that recognized this peptide, p17 KIRLRPGGKKKYKL, and one additional unknown epitope				
	• The two clones that recognized this epitope used two different V β genes, further demonstrating a polyclonal response				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(273-282 IIIB)	p24(143-150)	R M Y S P T S I	HIV-1 infection	human(B52)	[Wilkes et al.(1996)]
	• Epitope defined in the context of the Pediatric AIDS Foundation ARIEL project				
p24(287-309)	p24(155-177)	Q G P K E P F R D Y V D R F Y - K T L R A F Q A	Peptide vaccination	murine	[Nakamura et al.(1997)]
	• Mice immunized with this synthetic peptide generated specific CTLs, a proliferative response, and antibodies				
	• The amino acids shown in the epitope field were based on the numbering provided by Nakamura et al., and may not be correct				
	• The CTL epitope was shown to be located in positions 291-300				
p24(290-309)	p24(157-178)	P K E P F R D Y V D R F Y K T - L R A E Q A S	HIV-1 infection	human(B14)	[Musey et al.(1997)]
	• Cervical and peripheral blood derived CTL clones from an HIV infected woman recognized this epitope				
p24(293-312 SF2)	p24(161-180)	F R D Y V D R F Y K T L R A E - Q A S Q D	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
	• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein				
	• 12 subjects had CTL that could lyse vaccinia expressed LAI gag				
	• One of these 12 had CTL response to this peptide				
	• The responding subject was HLA-A2, A3, B8, B62				
p24(298-306 IIIB)	p24(166-174)	D R F Y K T L R A	HIV-1 infection	human(B14)	[Wilkes et al.(1996)]
	• Epitope defined in the context of the Pediatric AIDS Foundation ARIEL project mother-infant HIV transmission study				
	• DRFYKLRA, a naturally occurring variant, was found in mother, and is recognized				
	• DQFYKLRA, a naturally occurring variant, was found in infant and is not recognized				

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(298-306 IIIB)	p24(166-174)	DRFYKTLRA	HIV-1 infection	human(B14)	[Cao et al.(1997)]
	• The consensus peptide for clades B and D is DRFYKTLRA				
	• The consensus peptide for clades A and C is DRFFKTLRA and it is equally reactive				
p24(298-306 LAI)	p24(166-174)	DRFWKTLRA	HIV-1 infection	human(B14)	[Harrer et al.(1996b)]
gag(298-306)	p24(166-174)	DRFYKTLRA	HIV-1 infection	human(B14)	[Yang et al.(1996)]
	• CD4+ cell lines acutely infected with HIV were studied to determine their susceptibility to lysis by CTL				
	• Clones specific for RT lysed HIV-1 infected cells at lower levels than Env or Gag specific clones				
	• The distinction was thought to be due to lower expression of RT relative to Env and Gag				
	• CTL can lyse infected cells early after infection, possibly prior to viral production				
gag(298-306)	p24(166-174)	DRFYKTLRA	HIV-1 infection	human(B14)	[Yang et al.(1997)]
	• CTL inhibit HIV-1 replication at effector cell concentrations comparable to those found <i>in vivo</i>				
	• CTL produced HIV-1-suppressive soluble factors – MIP-1 α , MIP-1 β , RANTES, after antigen-specific activation				
	• CTL suppress HIV replication more efficiently in HLA-matched cells				
p24(305-313)	p24(173-181)	RAEQASQEV	HIV-1 infection	human(Cw8)	[Johnson et al.(1991)]
	• Originally reported as HLA-B14 restricted, but subsequently found not to be presented by cells transfected with B14				
	• Thought to be HLA-Cw8 restricted (C. Brander and B. Walker)				
p24(305-313)	p24(173-181)	RAEQASQEV	HIV-1 infection	human(B14?)	[Price et al.(1995)]
	• Study of cytokines released by HIV-1 specific activated CTL; HLA restriction uncertain, see p24(305-314)				
p24(305-313)	p24(173-181)	RAEQASQEV	HIV-1 infection	human(B14)	[Lubaki et al.(1997)]
	• 82 HIV-1-specific CTL clones from 5 long term non-progressors were isolated and analyzed for breadth of response				
	• A sustained Gag, Env and Nef response was observed, and clones were restricted by multiple HLA epitopes, indicating a polyclonal response				
	• Despite this being a well defined conserved epitope, none of the 11 gag-specific clones from a B-14 positive subject could recognize either it or p24 PQDLNTMLN				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(306-316 LAI)	p24(174-184) • Per. comm. from D. Lewinsohn to C. Brander and B. Walker	AEQASQDVKNW ?	human(B44)	[Brander & Walker(1997b)]	
p24(309-317 LAI)	p24(176-184) • Recognition of this peptide by two long term non-progressors • Peptide defined on the basis of B*5801 binding motif, yet not cross-restricted except at high concentrations	QASQDVKNW HIV-1 infection	human(B*57)	[Goulder et al.(1996b)]	
p24(308-316 LAI)	p24(176-184) • Minimal sequence determined through epitope mapping • This is a relatively conserved epitope • HLA-Cw0401 was defined as the restricting element, but cells that carry Cw0401 varied in their ability to present this epitope – this could be the result of diminished cell-surface expression of Cw0401 in some cells	QASQEVKNW HIV-1 infection	human(Cw0401)	[Buseyne et al.(1997)]	
p24(313-322 LAI)	p24(181-190) • P. Johnson pers. comm.	VKNWMTETLL ?	human(B8)	[Brander & Walker(1997a)]	
p24(323-342 SF2)	p24(191-210) • P. Johnson pers. comm.	VQNANPDKCKTILKAL-GPAAT HIV-1 infection	human(mk)	[Lieberman et al.(1997)]	
		• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein • 12 subjects had CTL that could lyse vaccinia expressed LAI gag • Three of these 12 had CTL response to this peptide • The responding subjects were HLA-A3, A24, B8, B55; HLA-A1, A11, B8, B27; and HLA-A1, A2, B8, B14			
p24(323-337)	p24(191-205) • Two CTL epitopes defined (see also p17(21-35))	VQNaNPDCKTILKAL HIV-1 infection	human(B8)	[Nixon & McMichael(1991)]	
p24(325-339 SF2)	p24(191-205) • Longitudinal study of CTL escape mutants	VQNaNPDCKTILKAL HIV-1 infection	human(B8)	[Phillips et al.(1991)]	

HIV CTL Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(325-333 IIIB)	p24(193-201)	NANPDCCKT _I	HIV-1 infection	human(B51)	[Wilkes et al.(1996)]
	• Epitope defined in the context of the Pediatric AIDS Foundation ARIEL project mother-infant HIV transmission study		human(B51)		
p24(329-337 LAI)	p24(197-205)	DCKTILKAL	?	human(B8)	[Sutton et al.(1993)]
	• Predicted epitope based on B8 binding motifs, from larger peptide VQNANPDCKTILKAL				
p24(329-337)	p24(197-205)	DCKTILKAL	HIV-1 infection	human(B8)	[Nowak et al.(1995)]
	• In a longitudinal study of CTL response, variant DCRTILKAL was also found, binds B8 but not recognized				
p24(329-337)	p24(197-205)	DCKTILKAL	?	human(B8)	[McAdam et al.(1995)]
	• Defined as minimal epitope by titration and binding studies				
p24(197-205)	p24(197-205)	DCKTILKAL	?	human(B8)	[Goulder et al.(1997e)]
	• Included in a study of the B8 binding motif				
p24(345-364 SF2)	p24(211-230)	LEEMMTACQQGVGGPG-	HIV-1 infection	human(unk)	[van Baalen et al.(1993)]
	HKARV				
	• Gag CTL epitope precursor frequencies estimated, peptide mapping				
p24(343-362 SF2)	p24(211-231)	IEEMMTACQQGVGGPG-	HIV-1 infection	human(unk)	[Lieberman et al.(1997)]
	HKARVL				
	• Of 25 patients, most had CTL specific for more than 1 HIV-1 protein				
	• 12 subjects had CTL that could lyse vaccinia expressed LAI gag				
	• One of these 12 had CTL response to this peptide				
	• The responding subject was HLA-A1, A2, B50, B57				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
p24(349-359 IIIB)	p24(217-227)	ACQGVGVGGPHK	HIV-1 infection	human(A11)	[Sipsas et al.(1997)]
		• HIV IIIB proteins were used to define the range of CTL epitopes recognized by three lab workers accidentally infected with HIV-1 IIIB			
		• ACQGVGGPSHK, a variant found in HIV RF, was also recognized			
p24(355-363 LAI)	p24(223-231)	GPGHKARVL	HIV-1 infection	human(B7)	[Goulder et al.(1997a)]
		• Identical twin hemophiliac brothers were both infected with the same batch of factor VIII			
		• One had a strong response to this peptide, the other a weak response			